

XXXIX.—*The Musci and Hepaticæ of the Pyrenees.*

By RICHARD SPRUCE.

[Continued from p. 293.]

Hemicyclum 2. *Acrocarpi.*

Tribus 9. BARTRAMIACEÆ, Bryol. Europ.

16. *Bartramia*, Hedwig.

§ 1. (= BARTRAMIA, Bridel.)

117. *B. stricta*, Brid. Mant. Musc. p. 116; Br. Europ. *Bartramia*, t. 1.

*Hab.* P. or. "in Pyrenæis et Monte serrato Hispaniæ, anno 1803" (Bridel, Br. Univ. 2. p. 45); *Concampa*, etiam *au montant de Boulon à Bellegarde* (Arnott!).

118. *B. gracilis*, Floerke in Schrad. Bot. Journ. 1799; M. P. 100. *B. Oederi*, Swartz; Br. Europ. *l. c.* t. 3.

*Hab.* Z<sub>1-2</sub> in rupibus umbrosis, haud infrequens.

119. *B. ithyphylla*, Brid. Mant. Musc. p. 116; Br. Europ. *l. c.* t. 2; M. P. 101.

*Hab.* Z<sub>2-5</sub> in rupibus graniticis terra obtectis.

120. *B. pomiformis*, Hedw. Sp. Musc. p. 164; Brid. Europ. *l. c.* t. 4; M. P. 102.

*Hab.* Z<sub>1-3</sub> in umbrosis, terrestris et rupestris.

Var. *crispa*, M. P. 103. *Bartramia crispa*, Sw. Musc. Suec. p. 73. *Hab.* in rupestribus præcipue subalpinis.

121. *B. Halleriana*, Hedw. Musc. Frond. 2. t. 40; Br. Europ. *l. c.* t. 5; M. P. 104.

*Hab.* Z<sub>2-3</sub> ad rupes in regione sylvatica superiore.

§ 2. (= PHILONOTIS, Bridel.)

122. *B. calcarea*, B. et S.! Br. Europ. *l. c.* p. 19. t. 10; M. P. 105.

*Hab.* Z<sub>1-3</sub> P. occ. et c. in solo calcareo secus ripas rivulorum vel in scaturiginosis calcareis. *Gélos*; *Gave de Combascou*, &c. *Tourmalet* et *Cirque d'Arbizon* (Philippe!).

123. *B. fontana*, L. Sp. Pl. p. 1574 (sub *Mnio*); Br. Europ. t. 9; M. P. 106.

*Hab.* Z<sub>0-4</sub> in humidis.

124. *B. marchica*, Hedw. Musc. Frond. 2. t. 39 (sub *Mnio*); Br. Europ. ! *l. c.* t. 8.

*Hab.* Z<sub>1-2</sub> P. occ. *Vallée de Béost*, sterilis; P. c. *B.-de-Bigorre*, sur la route de *Toulouse*, fertilis (Philippe!).

Tribus 10. OREADEÆ, Br. Europ.

17. *Catoscopium*, Bridel.

125. *C. nigratum*, Dicks. Cr. Fasc. 3. p. 9 (sub *Bryo*); Br. Europ. *Catoscop.* (cum icone); M. P. 99.

*Hab.* Z<sub>2</sub> P. occ. *Mont Lizé*, in paludosis secus rivulos.

Tribus 11. GEORGIACEÆ.

(*Tetraphideæ*, Br. Europ.)

18. *Georgia*, Ehrh. Hann. Magaz. 1780, p. 931.

(*Tetraphis*, Hedw. Fund. Musc. 2. p. 87.)

126. *G. pellucida*, L. Sp. Pl. p. 1574 (sub *Mnio*). *G. Mnemosyne*, Ehrh. l. c.; C. Muell. Synops. Musc. p. 182. *Tetraphis pellucida*, Hedw.; Br. Europ. *Tetraphis* (cum ic.); M. P. 319.

*Hab.* Z<sub>0-2</sub> ad ligna putrida.

127. *G. Browniana*, Dicks. Crypt. Fasc. 4. p. 7. t. 10. f. 6 (sub *Bryo*); C. Muell. Synops. Musc. p. 181. *Tetrodontium Brownianum*, Schwgr. Suppl. t. 128.

*Hab.* Z<sub>2</sub> P. c. locis occultis ad rupes arenaceas, &c. præprimis ferro oxydatas: rara et semper *Campylostelium saxicola* consociata. *Labassère. V. de Castelloubon.*

Tribus 12. BRYACEÆ.

(*Bryaceæ* et *Mielichoferiæ*, Br. Europ.)

19. *Mielichoferia*, Hornsch. et Nees.

128. *M. nitida*, H. et N. Br. Germ. P. 2. § 2. p. 183. t. 41; Br. Europ. ! *Mielichof.* (cum ic.); M. P. 98.

*Hab.* Z<sub>1-4</sub> P. occ. et c. in rupibus argillaceo-schistosis, locis *Gorge de Cauterets* et *Port de Bénasque*. P. or. *Crabère* (Arnott!); in convalle *Eynes* (*Montagne, l. c.*); in valle de *Lio* (Thomas in Br. Europ.).

20. *Bryum*, Dillenius.

§ 1. (= *STENOBRYUM*, Wils. in litt.)

129. *B. pyriforme*, L. fil. (sub *Mnio*); Br. Europ. *Bryum*, t. 18.

*Hab.* Z<sub>1 sup.</sub> P. c. locis *route de Bagnères à Gazos* et *bords de la route de Toulouse*, ubi invenit am. Philippe !

§ 2. ELONGATA.

130. *B. acuminatum*, Hoppe et Hsch. Bot. Zeit. 1819, p. 94 (sub *Pohlia*); Br. Europ. ! l. c. p. 21. t. 6; M. P. 107.

*Hab.* Z<sub>2-4</sub> in rupibus terra obtectis Pyr. centralium. *Esquierry. Lac d'Espingo. En montant au Lac Lehou* (Philippe!).

Var.  $\beta$ . *minus*, Br. Europ. l. c.; M. P. 108. *Pohlia minor*, Schleich.; Schwgr. Suppl. t. 64.—*Hab.* ad viarum cavarum la-

tera in regione sylvatica. P. occ. *Gorge de Caunterets*; *Pont d'Espagne*. P. c. *Chaos de Gavarnie*.

*Florescentia* haud semper *monoica*; nonnunquam *hermaphrodita* est, in tali re *sterilis*; quandocunque autem *dioica* invenitur tunc plerumque *fertilis*!

131. *B. polymorphum*, H. et H. Bot. Zeit. 1819, p. 95 (sub *Pohlia*); Br. Europ. ! *l. c.* p. 25. t. 8; M. P. 109.

*Hab.*  $Z_2$  terrestre in abiegnis juxta pontem dict. *d'Espagne*.

Var. *curvisetum*, Br. Europ. *l. c.* *Pohlia curviseta*, H. et H. *l. c.* p. 98.—*Hab.*  $Z_{3-4}$  *V. de Combascou. Esquierry. Port de Bénasque*. In P. or. locis *Mt. Canigou* et *Vallée d'Eynes* detexit cl. Arnott!

132. *B. elongatum*, Dicks. Crypt. Fasc. 2. p. 8; Br. Europ. ! *l. c.* p. 32. t. 10.—Var. 1, M. P. 110.

*Hab.*  $Z_{1-3}$  ad vias cavas, in rupibus terra obtectis, &c., per totos Pyrenæos sylvaticos.

“Var. 2. foliis angustissimis, *peristomio interno perfecto*. Ad Br. *elongatum*  $\gamma$ . *macrocarpum*, Br. Europ. accedit.” M. P. 111.—*Hab.* ad pinorum truncos cariosos in monte *Crabioules*.

“Var. 3. foliis brevioribus, capsulis longioribus, *peristomii interni ciliis subnullis*.” M. P. 112.—*Hab.* circa *B. de-Luchon* in sylvaticis editioribus, terrestre, locis *Bois de Sajust, Lac de Séculéjo*, &c.

133. *B. longicollum*, Sw. Musc. Suec. pp. 49, 99. t. 6; M. P. 133.

*Hab.*  $Z_2$  P. c. in rupium fissuris juxta lacum *Séculéjo*.

134. *B. crudum*, Schreb. Fl. Lips. p. 83; Br. Europ. *l. c.* p. 37. t. 13; M. P. 114.

*Hab.*  $Z_{1\text{sup.}-4}$  in rupibus montium humiliorum, frequens: rarius in alpes ascendens (*Port de Bénasque*).

### § 3. NUTANTIA.

135. *B. nutans*, Schreb. Fl. Lips. p. 81; Br. Europ. *l. c.* p. 34. t. 12; M. P. 115.

*Hab.*  $Z_{0-4}$  ad terram in sylvis, nec non in alpinis.

136. *B. Ludwigii*, Spreng. var.  $\beta$ . *gracile*, Bryol. Europ. *l. c.* p. 39. t. 14; M. P. 119.

*Hab.*  $Z_4$  P. c. in vicinia molium glacialium montis *Crabioules*; secus ripas lacus *Lehou* (Philippe!).

137. *B. albicans*, Wahl. in Wcb. et Mohr Ind. Musæi. *B. Wahlenbergii*, Schwgr.; Br. Europ. *l. c.* p. 44. t. 17; M. P. 118.

*Hab.* (*forma typica*)  $Z_1$  ad rivulorum ripas circa *Gélos*, P. occ.: rarius.

Var. *glaciale*, Br. Europ. l. c. *Bryum glaciale*, Schleich. in Brid. Br. Univ. 1. p. 852.

*Hab.* Z<sub>4</sub> P. c. in eodem loco ac *B. Ludwigii* β. P. or. V. d' Eynes (Arnott!).

138. *B. carneum*, L. Sp. Pl. p. 1587; Br. Europ. l. c. p. 43. t. 16; M. P. 116.

*Hab.* Z<sub>1</sub> P. c. in rivulorum glareosis circa *B.-de-Bigorre*: rarius.

139. *B. Tozeri*, Grev. Scot. Crypt. Fl. t. 285; M. P. 117.

*Hab.* Z<sub>0-1 inf.</sub> P. occ. in argillaceo-arenosis circa *Pau* et *St. Sever*; in rupibus ophiticis *Sti. Pandelon* prope Aq. Tarbellicas. Auctumno et vere fructificat.

§ 4. JULACEA.

140. *B. julaceum*, Smith, Fl. Brit. p. 1357; H. et T. ! Musc. Brit. p. 197. t. 28; Schwgr. Suppl. t. 195; M. P. 120.

*Hab.* Z<sub>2</sub> P. c. ad rupes humectas juxta cataractam dict. *la Cascade du Cœur*: nusquam alias visum.

141. *B. concinnatum*, Spruce in Musc. Pyr. n. 121: dioicum, *gracilescens*, parce ramosum; *caule ramisque tereti-julaceis*; foliis nitidis, erectis, imbricatis, ovatis et ovali-lanceolatis, *breviter apiculatis*, concavis, integerrimis vel sub apice obsolete denticulatis, anguste areolatis, *marginè planis*, *nervo cum apice evanido*.

*Hab.* Z<sub>1</sub> P. occ. in rupibus humidiusculis ad viam quæ ducit a pago *Pierrefitte* ad opp. *Cauterets*; P. c. in via cava ad pedem montis *Superbagnères* prope *B.-de-Luchon*.—In Anglia ad cataractam *Caldron Snout* dictam fl. *Tees*, mense Julio, 1843, detexi.—Planta ♀ sola, sterilis, hucusque observata.

Pusillum, cæspitosum; cæspites in parte inferiori tomento radiculoso cohærentes. *Caulis*  $\frac{1}{2}$ –1 unc. erectus vel ascendens, julaceus, e basi ipsa uno eodemque modo foliosus, ramos nonnullos teretes plerumque simplices, inferiores sæpius fastigiatos proferens, inferne rubellus, superne viridis. *Folia* erecta, imbricata, ovata v. ovali-lanceolata, apiculo brevi subreflexo, concava, alis basilaribus inflexis, margine ipsa plana, integerrima, rarius ad apicem versus obsolete denticulata, nervo percurrente instructa, e cellulis elongato-rhomboidis-hexagonisve minoribus curvulis, superne arctius, basi cellulis latioribus laxius, areolata, inferiora paulo longiora fuscescentia, superiora pallide viridia nitida. *Flores* *feminei* terminales seu pseudoalares; *folia* erecta, elongato-lanceolata, subplana, interiora minora; *archegonia* et *paraphyses* numerosi, pari longitudine.

Differt *B. julaceum*, Smith, statura majori, *foliorum apice obtusiori subinflexo*, *nervo ante apicem evanido*, areolisque angustioribus; *B. atropurpureum* gemmiparum (= *B. gracilentum* Tayl. olim) *foliis erectopatulis, brevioribus, apiculo obtuso* quasi truncato terminatis, e cellulis minus elongatis conflatis; *B. Funkii*, Schwgr., *foliis nervo validiori excurrente instructis, areolisque multo majoribus*; *B. Blindii*,

Schimp., *foliis evanidinerviis*; *B. semiovatum*, Brid., *foliis nervo crasso apicem excedente.*

*Obs.* In foliorum superiorum axillis nonnunquam adsunt gemmæ fasciculatæ (2-9-natæ) saturate purpurascens, folia minuta arcte imbricata sistentes, iis *B. julacei* haud absimiles.

§ 5. ARGENTEA.

142. *B. argenteum*, L. Sp. Pl. p. 1586; Br. Europ. *l. c.* p. 78. t. 41.

*Hab.*  $Z_0^{-1}$  in ruderatis, muris, &c.

143. *B. Zierii*, Dicks. Crypt. Fasc. 1. t. 4. f. 10; Br. Europ. *l. c.* p. 29. f. 9; M. P. 122.

*Hab.*  $Z_{2-3}$  in rupibus humidiusculis. P. c. *Lac de Séculéjo*; *Labassère*, &c. P. or. *Mont Louis* (Arnott!).

§ 6. CÆSPITICIA.

144. *B. pallens*, Sw. Musc. Suec. p. 47. t. 4; Br. Europ. ! *l. c.* p. 68. t. 33; M. P. 123. *B. turbinatum*, H. et T. ! Musc. Brit. p. 202. t. 29.

*Hab.*  $Z_{1-3}$  in humidis præcipue secus rivulos, frequens.

145. *B. pallescens*, Schwgr. Suppl. t. 75; Br. Europ. ! *l. c.* p. 51. t. 22; M. P. 124.

*Hab.*  $Z_{2-3}$  plerumque secus rivulos, haud rarum. *Les Eaux Chaudes*; *Chaos de Gavarnie*; *Lac Lehou* et *Pic du Midi* (Philippe!), &c. In tugurii pastoricii tecto ad latus orientale montis *Tourmalet*.

146. *B. bimum*, Schreb. Fl. Lips. p. 83; Br. Europ. *l. c.* p. 50. t. 21.

*Hab.*  $Z_2$  P. or. *Vallée d'Eynes* (Arnott!).

147. *B. cirrhatum*, H. et H. Bot. Zeit. 1819, p. 70; Br. Europ. fasc. 32. p. 8. t. 11.

*Hab.*  $Z_{3-4}$  in humidis graminosis P. c., locis *Esquierry* et *Port de Bénasque*.

148. *B. inclinatum*, Sw. Musc. Suec. p. 45 et 96 (sub *Pohlia*); Br. Europ. ! *Bryum*, p. 17. t. 3; M. P. 125.

*Hab.*  $Z_{1-2}$  ad terram saxaque, sed rarius. P. occ. circa *Cauterets*. P. c. *V. de Lesponne*. P. or. *Cambrédazes* (Arnott!).

149. *B. cernuum*, Hedw. Sp. Musc. p. 58. t. 9 (sub *Cynodontio*); Br. Europ. *l. c.* p. 14. t. 1.

*Hab.*  $Z_{1-4}$  ad saxa, rarius. P. occ. *Oloron*. P. c. prope pagum *Luz*; *Pic du Midi* à 1300 *toises* (Philippe!).

150. *B. cæspiticium*, L. Sp. Pl. p. 1586; Br. Europ. *l. c.* t. 34.

*Hab.*  $Z_1$  P. occ. prope *Oloron*, ubi *cæspitem unicum* inveni!!

? Var.  $\gamma$ . *imbricatum*, Br. Europ. *l. c.* p. 70. t. 35; M. P. 126. —*Hab.* ad muros in valle *Campan* juxta *Ste. Marie*, sterile.

151. *B. erythrocarpon*, Schwgr. Suppl. t. 70.

*Hab.* Z<sub>1</sub> P. occ. supra pagum *Jurançon*, in solo arenoso juxta rivulum.

152. *B. atropurpureum*, W. et M. Ind. Mus. ; Br. Europ. l. c. p. 73. t. 37 ; M. P. 127.

*Hab.* Z<sub>0-1</sub> in muris, ad terram, &c., vulgatum.

153. *B. alpinum*, L. Mant. 2. p. 309 ; Br. Europ. l. c. p. 76. t. 39 ; M. P. 128.

*Hab.* Z<sub>1 sup.-3</sub> in saxis secus rivulos : fructiferum juxta thermas supra pagum *Penticosa* Aragoniæ, etiam in faucibus dict. *Gorge de Luz* et *Gorge de Labassère*.

154. *B. pseudotriquetrum*, Hedw. Musc. Frond. 3. t. 7 (sub *Mnio*) ; Br. Europ. l. c. p. 54. t. 24 ; M. P. 129. *B. ventricosum*, Dicks. ; H. et T. ! Musc. Brit. p. 205. t. 30.

*Hab.* Z<sub>1 sup.-3</sub> in rupibus humidis, frequens.

155. *B. turbinatum*, Hedw. var.  $\gamma$ . *latifolium*, Br. Europ. ! l. c. p. 65. t. 32 ; M. P. 130. *B. Schleicheri*, Schwgr. Suppl. t. 73.

*Hab.* Z<sub>3-5</sub> ad fontes in alpinis. *Penticosa* ; *Lac de Séculéjo* ; *Mt. Maladetta*, &c. *Vallon d'Arise* (Philippe !).

#### § 7. CAPILLARIA.

156. *B. obconicum*, Hornsch. ; Bryol. Europ. ! l. c. p. 59. t. 27 ; M. P. 131.

*Hab.* Z<sub>1</sub> P. occ. et c. ad muros, haud infrequens. *Jurançon* ; *Bagès* ; *Arreau*, &c. *Bagnères* (Philippe !).

157. *B. platyloma*, Schwgr. Suppl. 1. P. 2. p. 116. t. 76 (non Br. et Sch.) ; M. P. 132.

*Hab.* Z<sub>1</sub> P. c. in rupibus humidiusculis prope pagum *Pierrefitte*.

This plant agrees closely with Schwaegrichen's figure and description above-cited, with the sole exception that the stems are rather more elongated. Through the favour of Mr. Wilson I have examined specimens gathered in the Canary Islands by Mr. Webb, and named "*Br. platyloma*, Schwgr." by Dr. Montagne : these agree in all characters of importance with the Pierrefitte plant. The latter differs essentially from the *B. platyloma* of B. and S. (*B. Donnianum*, Grev.) in the leaves having a broad margin of 4-6 rows of cellules ("in sex circiter series digestæ," Schwgr. l. c.), but composed of only a single layer ; while those of *B. Donnianum* have a margin only 2 or 3 cellules in width, but decidedly thickened ("margine e strato duplici cellularum . . . circumducta," Br. Europ.), in other words they are *pachylomatous* but not *platylomatous*. The leaves of the true *B. platyloma* differ further in being far smaller, rigid, nearly erect, by no means "in comam patulam congesta" (as represented in 'Bryol. Europæa,' but not in Schwaegrichen), the strong nerve running out into a point

which equals  $\frac{1}{3}$  or  $\frac{1}{4}$  of the rest of the leaf, while those of the 'Bryol. Europæa' plant "n'offrent ordinairement qu'une pointe courte, formée par le rapprochement des bords de la feuille." In habit the two plants differ very considerably.

There is still one doubt remaining, namely whether *B. platyloma*, Schwgr., and *B. obconicum*, Hornsch., be merely forms of one and the same species. There is some difference in external aspect, and the latter has the leaves *scarcely marginated*, paler and less rigid, with a longer-necked, *perfectly symmetrical* and usually more pendulous capsule.

158. *B. torquescens*, B. et S. Br. Europ. *l. c.* p. 49. t. 20; M. P. 133.

*Hab.* Z<sub>0-1</sub> P. occ. ad terram prope Jurançon et Cauterets.—Circa Montpellier (Arnott!).

"Var. *florescentia monoica*;" M. P. 134. *B. fuscescens*, nob. in hb.—*Hab.* Z<sub>0-1</sub> P. occ. prope St. Sever in Agro Syrtico, loco Landes de Mugriet, in terra arenosa; etiam in muro prope Oloron.

(*Descr. varietatis.*) *Plantæ* gregariæ. *Folia* fuscescentia, *subpattula*, siccando appressa *parum tortilia*, elongato-obovata, apiculata, nervo tenui excurrente cuspidata, concava, *haud carinata*, 2-3 cellularum angustiorum seriebus marginata, apice denticulata. *Flores* *feminei constricti*, 6-8 folii. *Flores masculi gemmiformes ad feminei basin nati*, sessiles vel in innovationibus terminales (rarius in planta propria); *folia perigonialia* sub-6, conniventia, exteriora ovato-acuminata, interiora minora, late-ovata, apiculata, antheridia numerosa paraphysibus numerosis sublongioribus stipata, complectentia. *Capsula* in pedunculo basin versus geniculato arcuatove subpendula, elongato-pyriformis, fere clavata, e fusco purpurascens. *Operculum* convexum, apiculatum, aurantiacum, nitens. *Peristomium*: externi dentes pallidi; *internum* membrana in processus carina valde pertusos *apice attenuatos*, ciliis 2-3-nis appendiculatis interjectis, fere ad medium fissa. *Annulus* latus, compositus. *Sporæ* olivaceæ.

The *monoicous inflorescence* is so constant a character in all the individuals from the two localities above-cited, that I am led to suppose this will prove a distinct species. In the typical form of *B. torquescens*, from Jurançon and Cauterets, the fertile flowers are all *hermaphrodite*, and quite *turgid* from the *numerous antheridia* they enclose along with the archegonia. Yet a minute comparison of all the other parts does not reveal any marked difference in the two plants, and I prefer waiting for further evidence before I undertake to decide on their being distinct or otherwise.

159. *B. capillare*, Hedw. Sp. Musc. p. 182; Br. Europ. *l. c.* p. 60. t. 28.

*Hab.* Z<sub>0-4</sub> "Var. 1." M. P. 135 (= *B. capillare a.* Br. Europ.): in planitie et montibus humilioribus, fere ubique ad saxa, &c.

"Var. 2. foliis longioribus, obovato-lanceolatis, siccitate patulis vix tortilibus (minime *spiraliter* tortis), capsulis elongatis

pallidis;" M. P. 136.—*Hab.*  $Z_{2-3}$  ad truncos putrescentes locis *Pont d'Espagne, Hourquette d'Aspin, Lac de Séculéjo, &c.*

"Var. 3." M. P. 137 (= *B. capillare*  $\beta$ . *cochlearifolium*, Brid. Br. Univ. 1. p. 666 = *B. capillare*  $\eta$ , Br. Europ.).—*Hab.*  $Z_{3-4}$  in alpinis, saxatile et terrestre, rarissime fertile. P. occ. *V. de Combascou.* P. c. *Lac Lehou; Esquierry.* P. or. in monte *Canigou* (Arnott!).

160. *B. Donnianum*, Grev. ! in Linn. Soc. Trans. 15. p. 345. t. 3. f. 6. *B. platyloma*, Br. Europ. l. c. p. 58. t. 26 (non Schwgr.). *B. Muelleri*, M. P. 138.

*Hab.*  $Z_0$  in terra arenosa Agri Syrtici prope *St. Sever*, sterile.

I published this in 'Musci Pyrenaici' as *B. Muelleri* mst., feeling convinced that it was perfectly distinct from the *B. platyloma* of Schwgr. (See above, under No. 157, for an exposition of the differences of the two species.) I owe to Mr. Mitten the suggestion that it is in reality the *B. Donnianum* of Greville, which we have since confirmed by an examination of the author's original specimens. The fertile plant has been found in Sussex by Messrs. Mitten and Jenner.

161. *B. roseum*, Schreb. Fl. Lips. p. 84; Br. Europ. l. c. t. 25; M. P. 139.

*Hab.*  $Z_1$  in sylvis, plerumque sterile. Fertile in sylva *Bois de Gerde dicta* (Philippe!).

#### 21. *Mnium*, Dillenius, Linnæus.

162. *M. spinosum*, Voit in Sturm. Flor. Germ. Crypt. 11. t. 16 (sub *Bryo*); Br. Europ. fasc. 5, *Mnium*, p. 26. t. 6; M. P. 140.

*Hab.*  $Z_2$  P. c. sub abietum umbra juxta pontem *Pont d'Espagne* dictum.

163. *M. spinulosum*, B. et S. ! Br. Europ. fasc. 31. p. 4. t. 4.

*Hab.*  $Z_2$  P. c. cum priore; etiam in trunco carioso *V. du Lys*.

164. *M. hornum*, L. Sp. Pl. p. 1576; Br. Europ. fasc. 5. p. 22. t. 4.

*Hab.*  $Z_{0-2}$  in sylvis, haud vulgatum.

165. *M. serratum*, Schrad. Spic. Fl. Germ. p. 71 (sub *Bryo*); Br. Europ. l. c. p. 24. t. 5.

*Hab.*  $Z_{1-2}$  in umbrosis præcipue secus rivulos. *Les Eaux Bonnes, &c. En montant au Lac Lehou* (Philippe!). *V. d'Eynes* (Arnott!).

166. *M. lycopodioides*, Br. Europ. fasc. 31. t. 2. (An *Bryum lycopodioides*, Hook. in litt. ad Schwgr.?)

*Hab.*  $Z_2$  P. c. *Vallon de Courbettes* (Philippe!).

167. *M. orthorhynchum*, Br. Europ. fasc. 5. p. 25. t. 5 (non Bridel).



*Hab.*  $Z_{1-2}$  P. occ. et c. : socio *M. serrato*. *Les Eaux Bonnes. Col de Louvie. Vallon de Courbettes*, etiam en montant au Lac *Lehou* (Philippe!).

168. *M. undulatum*, Hedw. Sp. Musc. p. 195; Br. Europ. *l. c.* p. 20. t. 3.

*Hab.*  $Z_{0-1}$  in umbrosis : fertile circa *Dax* (Grateloup!), *Pau* (Southby!) et *B.-de-Bigorre* (Philippe!).

169. *M. affine*, Bland. Musc. Exs. fasc. 3. n. 153; Br. Europ. *l. c.* p. 30. t. 9.

*Hab.*  $Z_1$  locis umbrosis humidiusculis : fertile prope *B.-de-Bigorre* (Philippe!).

170. *M. medium*, B. et S. ! Br. Europ. *l. c.* p. 32. t. 12; M. P. 142 (*forma major*).

*Hab.*  $Z_2$  P. c. in saxosis umbrosis secus rivulos sylvæ *Bois de Gouerdère* dictæ prope *B.-de-Luchon*.

171. *M. rostratum*, Schrad. Spicil. p. 72 (sub *Bryo*); Br. Europ. *l. c.* p. 27. t. 7; M. P. 143.

*Hab.*  $Z_1$  ad latera viarum cavarum.

172. *M. cuspidatum*, Hedw. Sp. Musc. p. 192. t. 45; Br. Europ. *l. c.* p. 29. t. 8.

*Hab.*  $Z_1$  in sylvaticis humidis, rarius. *Jurançon. V. du Lys*.

173. *M. punctatum*, Schreb. Fl. Lips. p. 85 (sub *Bryo*); Br. Europ. *l. c.* p. 19. t. 2; M. P. 144.

*Hab.*  $Z_{1-2}$  in scaturiginosis.

174. *M. stellare*, Hedw. Sp. Musc. t. 40; Br. Europ. ! *l. c.* p. 33. t. 13; M. P. 145.

*Hab.*  $Z_{1-2}$  P. occ. et c. supra ligna putrida inque saxosis umbrosis montis *Goursi* prope *les Eaux Bonnes*; nec non in valle *du Lys* et circa *B.-de-Bigorre* : rarissime fructiferum.

† “*M. latifolium*, foliis ovato-subrotundis solidinervibus marginatis subdenticulatis concavis, caule longo subsimplici.

“Lectum est a Schleichero in Helvetia, missum e Pyrenæis; sine flore.

“Foliorum forma *punctato* aliquo modo simile, si madet; sed habitu et foliis erecto-incumbentibus, siccitate parum plicatis, distinctum. Locum hic habet propter foliorum texturam, Mnio similem.” Schwgr. Suppl. 1. P. 2. p. 138.

Very probably this is nothing more than a sterile form of *B. punctatum*, such as I have myself gathered in the Vallée de Lutour, remarkable for its elongated stems and appressed leaves when dry: hence resembling externally *M. cinclidioides*, Blytt.

## 22. *Aulacomnion*, Schwgr.

175. *A. androgynum*, L. Sp. Pl. p. 1574 (sub *Bryo*); Br. Europ. *Aulacomnion*, p. 11. t. 4; M. P. 146.

*Hab.*  $Z_1$  in rupibus umbrosis, rarum. P. occ. *Gave de Gabas.* P. c. *Forêt de Transoubât* (Philippe!).

176. *A. palustre*, L. Sp. Pl. p. 1574 (sub *Bryo*); Br. Europ. l. c. p. 9. t. 3.

*Hab.*  $Z_1$  in paludosis. P. c. prope *Bagnères* (Philippe!). P. or. *Mt. Canigou* (Arnott!).—Plantam per Europam septentrionalem *vulgatissimam* nusquam in Pyrenæis loco natali conspiciere mihi contigit!

23. *Timmia*, Hedwig.

177. *T. Megapolitana*, Hedw. Musc. Frond. 1. p. 83. t. 31; Br. Europ. *Timmia*, t. 1.

*Hab.*  $Z_3$  P. c. *Pic du Midi de Bigorre* (Philippe!). P. or. *Mt. Canigou*, *Mt. Cady* et *Cambrédazes* (Arnott!).

178. *T. austriaca*, Hedw. Sp. Musc. p. 176. t. 42; Br. Europ. l. c. t. 2.

*Hab.* "in Pyrenæis" (Bryol. Europ.).—Planta mihi haud obvia.

Tribus 13. POLYTRICHACEÆ, Bryol. Europ.

24. *Polytrichum*, Dillenius.

§ 1. (= CATHARINEA, Ehrh. = ATRICHUM, P. Beauv.)

179. *P. undulatum*, L. Sp. Pl. p. 1530 (sub *Bryo*); M. P. 300; Br. Europ. *Atrichum*, p. 8. t. 1, 2.

*Hab.*  $Z_{0-3}$  in umbrosis humidiusculis.

180. *P. angustatum*, Hook. Musci Exot. t. 50; M. P. 301; Br. Europ. *Atrichum*, p. 9. t. 3. *Catharinea a.*, Brid.; Sulliv. ! Musci Allegh. n. 118.

*Hab.*  $Z_{0-1}$  P. c. in collibus siccis dumetosis sylvæ *Bois de La-gaillaste* dictæ prope *B.-de-Bigorre*. P. occ. locis similibus *Sti. Pandelon* prope *Dax*.

§ 2. (= OLIGOTRICHUM, DeCandolle.)

181. *P. hercynicum*, Hedw. Musc. Frond. 1. t. 13; M. P. 302; Br. Europ. *Oligotrichum*, t. 5.

*Hab.*  $Z_{3-4}$  P. c. in regione inferalpina montis *Crabioules*, terrestre; in alpinis juxta lacum *Lehou* et supra pagum *Gazos* (Philippe!).—? "*Dax*, dans les endroits tourbeux." (Thore in Fl. Franç.)

§ 3. (= POGONATUM, Pal. Beauv.)

182. *P. nanum*, Hedw. Musc. Frond. 1. t. 13; M. P. 303; Br. Europ. *Pogonatum*, p. 5. t. 7.

*Hab.*  $Z_{0-1}$  ad aggeres arenosas subhumidas.

The *obscurely toothed* (not sharply serrate) leaves and their *wavy lamellæ* afford good characters for distinguishing this species from *P. aloides*. I gathered near Pau, by the Bordeaux road, an ano-

malous *Polytrichum*, which may possibly be a starved form of *P. nanum*. It has the capsule subcernuous, nearly spherical; *the columella 4-sulcate*, or rudimentarily alate (not *terete* as in typical *P. nanum*); and *the calyptra sheathing the whole of the capsule*.

183. *P. aloides*, Hedw. Musc. Frond. 1. t. 14; M. P. 304; Br. Europ. *Pogonatum*, p. 6. t. 8.

*Hab.* Z<sub>0-3</sub> in humidiusculis, præsertim in arena rivulorum, altius versus alpes ascendens quam *P. nanum*.

184. *P. urnigerum*, L. Sp. Pl. p. 1573; M. P. 305; Br. Europ. *Pogonatum*, p. 7. t. 9.

*Hab.* Z<sub>0-2</sub> in arenosis humidiusculis.

185. *P. alpinum*, L. Sp. Pl. p. 1573; Br. Europ. *Pogonatum*, p. 9. t. 10.

*Hab.* Z<sub>2-4</sub> P. c. in monte *Crabioules*.

Var. caule valde elongato, subsimplici; M. P. 306.—*Hab.* in saxosis umbrosis vallis *Lutour* prope *Cauterets*.

The curious way in which the *epiphragm* (the *tympaniform* dilatation of the summit of the *columella*) is attached to the *peristome* in this and other *Polytricha* does not seem to have been anywhere described. In *P. alpinum* it is originally placed at the base of the teeth, to which it is attached by means of processes equaling them in number and exactly covering their internal face. After the fall of the lid, these processes are gradually detached and the *epiphragm* rises, probably from the pressure of the full-grown spores beneath it, so as to allow the latter to escape through the interstices of the *peristome*. When the *epiphragm* is quite liberated, either naturally or by art, *the processes curve inwards upon its upper surface* (see Pl. I. fig. 1) so as to be with difficulty seen, unless the light be properly regulated or the *epiphragm* be set up on its edge. The processes are composed of only a single layer of cellules, which are so disposed that their interstices form vertical lines corresponding to those on the teeth.

The adhesion of the *epiphragm* to the teeth is so great as to resist the action of the *columella* to draw it down into the capsule, and often ultimately to cause the rupture of the *columella*. The ragged portion at the underside of the section (fig. 2) is where the rupture takes place between the *columella* and the *epiphragm*.

In *P. urnigerum*, *aloides* and *nanum* the *epiphragm* is attached to the teeth in the same manner, but the processes are very thin and tender, and when the *epiphragm* is detached by force they often remain adhering to the teeth. In *P. angustatum* (as also probably in *P. undulatum*) the processes are united to each other by an intervening membrane, which is *granulated* on the surface, while the processes themselves are *smooth* and marked by lines similar to those on the teeth: in other words, the *epiphragm* is bordered by an inflexed *continuous* membrane, by means of which it adheres to the *peristome*. The figure of *P. angustatum* in 'Bryol. Europæa' represents this pretty well, but no mention is made of it in the text.

§ 4. (= POLYTRICHUM, Brid. et Bryol. Europ.)

186. *P. sexangulare*, Hoppe, Bot. Taschb. p. 150; Br. Europ. *Polytrichum*, p. 7. t. 11.

*Hab.* Z<sub>3-4</sub> P. c. locis *Esquierry* et *Port de Paillère* (Arnott!).

187. *P. formosum*, Hedw. Sp. Musc. t. 9; Br. Europ. *Polytrichum*, p. 9. t. 12; M. P. 307.

*Hab.* Z<sub>0-2</sub> ad terram in sylvis, haud infrequens.

188. *P. commune*, L. Sp. Pl. p. 1573; Br. Europ. *Polytr.*, p. 13. t. 17; M. P. 308.

*Hab.* Z<sub>0-2</sub> in Agri Syrtici ericetis; in Pyrenæorum rupestribus humidis.

189. *P. juniperinum*, Hedw. Sp. Musc. t. 13; Br. Europ. *Polytr.*, p. 12. t. 15; M. P. 309.

*Hab.* Z<sub>1-5</sub> in rupibus terra obtectis, e montibus humilioribus usque in summos alpes ascendens.

190. *P. piliferum*, Schreb. Fl. Lips. p. 74; Br. Europ. *Polytr.*, p. 11. t. 14; M. P. 310.

*Hab.* Z<sub>1-4</sub> locis sterilibus ventosis: haud vulgare.

Tribus 14. BUXBAUMIACÆ, Bryol. Europ.

25. *Buxbaumia*, Haller.

191. *B. aphylla*, Hall. Stirp. Helv. 2. p. 83; Br. Europ. fasc. 1 (cum icone).

*Hab.* Z<sub>0</sub> P. occ. in vicinia *St. Sever*, ubi in declivibus arenosis umbrosis secus fl. *Adour* ripas invenit cel. Dufour!

192. *B. indusiata*, Brid. 1. p. 331. t. Suppl. 2; Br. Europ. fasc. 1. p. 6. t. 2.

*Hab.* Z<sub>1-2</sub> in truncis putridis, rarissime. P. occ. in regione media montis *Pic de Ger*; nec non in valle *Jéret*. P. c. *Vallée de Campan* in sylva *Forêt de Paiollet* dicta (Philippe!).

26. *Diphyscium*, Web. et Mohr.

193. *D. foliosum*, L. Syst. Veg. ed. 14. p. 925 (sub *Buxbaumia*); Br. Europ. fasc. 1. p. 3. t. 2; M. P. 320.

*Hab.* Z<sub>0-1</sub> ad terram in sylvis, vulgatum.

Tribus 15. MEESIACÆ, Bryol. Europ. (ex parte).

27. *Meesia*, Hedwig.

194. *M. trichodes*, L. Succ. n. 1006 (sub *Bryo*); M. P. 147. *Meesia uliginosa*, Hedw.; B. et S.! Br. Europ. fasc. 10. p. 5. t. 1.

*Hab.* Z<sub>2-4</sub> P. occ. in spongiosis montis *Lizé*. P. c. secus ripas lacus *Lehou*; *Vallon du Hour* (Philippe!); *Esquierry* (Arnott!). P. or. *V. d'Eynes* (Arnott!).

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## Tribus 16. FUNARIACEÆ, Bryol. Europ. (ex parte).

28. *Amblyodon*, Pal. Beauv.

195. *A. dealbatus*, Dicks. Crypt. fasc. 2. p. 8. t. 5. f. 3 (sub *Bryo*); Br. Europ. *Amblyodon* (cum ic.).

*Hab.* Z<sub>2</sub> in spongiosis. P. occ. in monte *Lizé*, socio *Meesia trichode*. P. or. *Port Nègre* (Arnott!).

29. *Funaria*, Schreber.

196. *F. hygrometrica*, L. Sp. Pl. p. 1575 (sub *Mnio*); Br. Europ. *Funaria*, t. 3; M. P. 148.

*Hab.* Z<sub>0-3</sub> locis exustis, rudertis et calcareis.

197. *F. convexa*, Spruce in *Musci Pyr.* 149. *F. serrata*, B. et S. Br. Europ. *Funaria*, p. 8. t. 2 (non Brid. Br. Univ. 2. p. 57).

*Hab.* Z<sub>0</sub> P. occ. *St. Sever*, in aggeribus arenosis, socio *F. Muehlenbergii*, a quo *operculo convexo* neutiquam convexo-conico primo visu dignoscenda.

I had come to the conclusion that this moss must be distinct from the *F. serrata* of Bridel (whose specimens were Pennsylvanian ones communicated by Palisot-de-Beauvois) before I had the opportunity of examining the specimens so named by Hooker and Wilson in Drummond's 'Mosses of the Southern States,' &c., No. 76, and those of Sullivant in his beautiful 'Musci Alleghanyenses,' No. 126; and it is satisfactory to find my opinion supported by the decisions of these eminent botanists. The American specimens agree much better with Bridel's description in the form of the leaves, &c. than do those of Bruch and Schimper. I find the perichæatial leaves of the former to be *oblong-lanceolate*, acute or subapiculate (*never acuminate*), plane, *serrated almost to the very base*, the rather strong nerve reaching *nearly to the point*, and it is sometimes only with a tolerably high power that it can be ascertained to fail one or two cellulæ below it. Bridel calls the leaves "acuminata" in his spec. char., but in his description he uses the more applicable term "acutiuscula." Of the nerve he says "proxime sub apicem abrupto nunc paulum excurrente:" I have never seen it excurrent, but it may well have appeared so in some cases with the inferior instruments which Bridel seems to have used.

*F. convexa* has the leaves larger, proportionally *much wider, spatulato-acuminate* ("forma peculiari, subspathulata," Br. Europ.), concave, the marginal serratures rarely descending below the middle, *the feeble nerve only  $\frac{3}{4}$  the length of the leaf*, and the areolation wider; the pedicel shorter, when dry *twisted to the right*; the mouth of the capsule more oblique and the teeth of the peristome with fewer articulations.

*F. convexa* is distinguished from *F. Muehlenbergii* by another obvious character, besides the one above-mentioned, namely by the calyptra being *persistent* on full-grown dried capsules, its beak *pointing downwards* and usually parallel to the pedicel; whereas in the

latter, the calyptra is rarely persistent on nearly mature capsules, in the dried state, and in these rare cases it is nearly erect. See also Bryol. Europæa, loc. cit.

198. *F. Muehlenbergii*, Turn. in Ann. of Bot. 2. p. 198; Schwgr. Suppl. t. 66; Bryol. Europ. l. c. t. 1; M. P. 150.

*Hab.*  $Z_{0-1}$  P. occ. in solo arenoso circa *St. Sever*. P. c. in rupibus calcareis terra obtectis juxta thermas dict. *de Salut, B.-de-Bigorre*.

I gathered very sparingly on mortar in a wall near Oloron, a *Funnaria* almost intermediate between this species and *F. hibernica*. The leaves are rarely obovate, usually ovate, acute or subapiculate; the nerve stronger than in *F. Muehlenbergii*, and failing very little below the apex; the margins almost quite entire. Pedicel when dry twisted to the left, except just beneath the capsule, where there is usually one turn to the right.

### 30. *Entosthodon*, Schwgr.

199. *E. Templetoni*, Hook. in Fl. Lond. ed. 2 (sub *Weisia*); H. et T. ! Musc. Brit. p. 77. t. 14; Br. Europ. *Entosthodon* (cum ic.); M. P. 151.

*Hab.*  $Z_0$  P. occ. in Agro Syrtico circa *St. Sever* et *St. Pandelon*, ubi ad terram arenosam socio *Physcomitrio fasciculari* viget.

### 31. *Physcomitrium*, Brid.

200. *Ph. ericetorum*, De Not. Syllab. p. 283; Bryol. Europ. *Physcomitrium*, p. 13. t. 3; M. P. 152. *Gymnostomum fasciculare*, H. et T. ! Musc. Brit. p. 23. t. 7.

*Hab.*  $Z_{0-1}$  P. occ. ad fossarum margines circa *Pau* et *St. Sever*.

201. *Ph. fasciculare*, Hedw. Sp. Musc. t. 4 (sub *Gymnostomo*); Br. Europ. ! l. c. p. 13. t. 4; M. P. 153.

*Hab.*  $Z_{0-1}$  cum præcedente; etiam P. c. circa *B.-de-Bigorre*.

202. *Ph. pyriforme*, Hedw. Sp. Musc. p. 38 (sub *Gymnost.*); Br. Europ. l. c. p. 11. t. 2; M. P. 154.

*Hab.*  $Z_{0-1}$  in iisdem locis ac n. 201.

203. *Ph. acuminatum*, Schleich. Cat. Plant. Helvet. p. 40 (sub *Gymnost.*); Br. Europ. l. c. p. 11. t. 3.

*Hab.*  $Z_{1\text{ sup}}$  in muro e limo constructo supra viculum *Bagès* vallis *d'Ossau*: rarissime.

### 32. *Ephemerum*, Hampe in Linnæa, 1832.

204. *E. serratum*, Schreb. de Phasco, p. 9. t. 2 (sub *Phasco*). *Phascum serratum*, Br. Europ. fasc. 1. p. 6. t. 1.

*Hab.*  $Z_1$  in agris cultis prope *B.-de-Bigorre*, rarissime.

In the 'Synopsis Muscorum' of C. Mueller (Berolini, 1848), where the classification of the genera displays much originality and acuteness of observation, the *Ephemera*, along with *Ephemerella*,

C. M., and *Voitia*, Hornsch., form a distinct tribe, under the name of *Ephemereæ*; but, considered as to the *sum* of their characters, I apprehend they must be united to *Funariaceæ*. The transition to recognized members of the latter family is in fact so gradual that it is impossible to indicate where the break should be made. *Ephemerum patens*, for example, is undistinguishable except by very minute examination from *Aphanorhegma serrata*, Sullivant (in Gray's 'Manual of the Botany of the Northern United States,' p. 647), which on its side is scarcely generically distinct from *Physcomitrium*. And if, by the almost universal consent of bryologists, *gymnostomous* mosses are no longer to form a separate tribe, but are to be distributed among those peristomatous tribes and genera to which they have in all their other characters a perfect affinity, why should we accord a greater favour to *astomous* mosses, which repose on an equally *negative* character for their separation? In other words, if there be no acknowledged tribe of *Gymnocarpi*, why should there be one of *Cleistocarpi*? This query is rendered more unanswerable by the consideration that as there are individual mosses (e. g. *Encalypta vulgaris*) which unite in themselves the characters of *Gymnostomi* and *Peristomati*, so there are other individuals which equally unite the characters of *Gymnostomi* and *Astomi*; I need only instance *Phascum rostellatum*, Brid., which has in some instances a *persistent*, in others a *deciduous* operculum, and is thus in itself both *cleistocarpous* and *stegocarpous*: if the former be considered its normal condition, it should be (according to our existing artificial systems) a *Phascum*; if the latter, a *Hymenostomum*!

I may in this place take occasion to remark on the very great rarity of Phascoid and other *annual* mosses in the Pyrenees. *Above the montose zone, I did not observe a single annual moss, for Funaria hygrometrica cannot strictly be considered such.* There is the same peculiarity in arctic countries, as for instance in Lapland, where according to Wahlenberg the *Phasca* and the smaller species of *Tortula* and *Gymnostomum* (i. e. *Pottia*) are altogether wanting! Contrast with this the following list of *Phasca*, abundant in cultivated ground near Montpellier in the autumnal and early winter months, which I owe to the kindness of Mr. Bentham; *Phascum axillare, bryoides, carniolicum, crispum, curvicollum, cuspidatum, Flærkeanum, muticum, pachycarpum* and *rectum*.

### Tribus 17. SPLACHNACEÆ, Bryol. Europ.

#### 33. *Tayloria*, Hook.

205. *T. serrata*, Hedw. Spec. Musc. t. 8 (sub *Splachno*); Br. Europ. *Tayloria*, p. 6. t. 1; M. P. 156.

*Hab.* Z<sub>3</sub> P. c. in monte *Crabioules* et ad lacum *Espingo*, juxta pastorum tuguria, terrestres.

Var.  $\gamma$ . *tenuis*, Br. Europ. l. c. t. 2; M. P. 157. *Splachnum tenue*, Dicks. Cr. Fasc. 2. p. 2.

*Hab.* Z<sub>2</sub> P. occ. supra ligna putrida in valle *Jéret*.

34. *Dissodon*, Grev. et Arnott.

206. *D. Frælichianus*, Hedw. Musc. Frond. 3. p. 99. t. 40. (sub *Splachno*).

*Hab.* Z<sub>4</sub> in terra humida P. centr. locis *Cirque d'Arbizon* (Philippe!) et ad latus boreale montis *Pic du Midi* dict. (De Lugo!)

Tribus 18. POTTIACEÆ, Br. Europ. (ex parte).

35. *Acaulon*, C. Muell. in Bot. Zeit. 1847, p. 99.

207. *A. muticum*, Schreb. (sub *Phasco*); Br. Europ. *Phascom*, p. 8. t. 2.

*Hab.* Z<sub>0-1</sub> P. occ. et c. ad terram, sed rarius. *St. Sever. B.-de-Bigorre*.

As I have above considered it expedient to place *Ephemerum* in *Funariaceæ*, on the same principle *Acaulon* and its allies (*Phasceæ*, C. Muell., excluding *Ph. crispum*, *multicapsulare*, *polycarpum* and *ros-tellatum*, which belong to *Weisiaceæ*) must go into *Pottiaceæ*. The near affinity of *Pottia minutula* to *Phascom cuspidatum*, &c. is too obvious to require proof; and as there are some *Phasca* (e. g. *Ph. bryoides*) which have an easily separable, not to say deciduous lid, there would seem to be no character, either natural or artificial, sufficiently constant to justify the separation of the latter from *Pottiaceæ*.

36. *Phascom*, Linnæus.

208. *Ph. cuspidatum*, Schreb. de Phasco, p. 8. t. 1; Br. Europ. *Phascom*, p. 12. t. 6; M. P. 322.

*Hab.* Z<sub>1</sub> in campis incultis prope *B.-de-Bigorre*, rarum.

37. *Pottia*, Ehrhart.

209. *P. truncata*, Hedw. Musc. Frond. 1. p. 13. t. 5 (sub *Gymnostomo*); Br. Europ. *Pottia*, t. 4.

*Hab.* Z<sub>0-1</sub> locis cultis, rudertis, &c.

38. *Anacalypta*, Roehling.

210. *A. latifolia*, Web. et M. B. T. p. 147 (sub *Grimmia*); Br. Europ. *Anacalypta*, t. 4.

*Hab.* Z<sub>4</sub> P. c. in altioribus montis *Pic du Midi de Bagnères* (Philippe!).

211. *A. Starkeana*, Hedw. Musc. Frond. 3. p. 83. t. 34 (sub *Weisia*); Br. Europ. *l. c. t. 1*.

*Hab.* Z<sub>0-1</sub> P. c. in solo calcareo juxta thermas dict. *de Salut* prope *B.-de-Bigorre*.

Var.  $\beta$ . *brachyodus*, Br. Europ. (*Weisia affinis*, Musc. Brit. p. 79. t. 14).—*Hab.* P. occ. in arenosis prope *St. Sever*.

212. *A. lanceolata*, Hedw. Musc. Frond. 3. p. 66. t. 23 (sub *Leersia*); Br. Europ. *l. c. t. 2*.



*Hab.* Z<sub>1</sub> P. c. locis ruderatis secus ripas fl. *Adour* supra *Bagnères* ! (Philippe !). Nusquam alias nobis nota.

39. *Desmatodon*, Bridel.

213. *D. latifolius*, Hedw. *Musc. Frond.* 1. t. 30 (sub *Dicrano*) ; Br. Europ. *Desmatodon*, p. 5. t. 1 ; M. P. 158.

*Hab.* Z<sub>3-4</sub> in alpinis, terrestribus. P. occ. *V. de Combascou*. P. c. *Port de Bénasque* ; *Pic du Midi* (Philippe !). P. or. *V. d'Eynes* (Montagne !); *Canigou*, *Cambrédazes* et *V. d'Eynes* (Arnott !).

Var.  $\beta$ . *muticus*, Brid. ; Br. Europ. ! l. c. t. 2 ; M. P. 159. *D. glacialis*, Funk.

*Hab.* Z<sub>4-5</sub> in summis *Pyrenæis*. *Port de Caunterets*. *Esquierry*.

214. *D. nervosus*, H. et T. ! *Musc. Brit.* p. 115. t. 20 (sub *Didymodonte*) ; Br. Europ. l. c. p. 6. t. 3 ; M. P. 160.

*Hab.* Z<sub>1</sub> P. c. in rupibus argillaceo-schistosis subdecompositis prope pagum *Loucrup*, non longe a *B.-de-Bigorre*, ubi am. Philippe detexit. P. or. ad viam quæ ducit a *Seo d'Urgel* ad *Andorram* (Arnott !); apud *Concampa* et ad *Pla de Sorroco* prope *Prats de Mollo* (Montagne !).

## Tribus 19. TRICHOSTOMACEÆ, Bryol. Europ.

40. *Tortula*, Hedwig.

*Obs.* The following species were observed only on calcareous rocks or soil, or on mortar in walls : *T. rigida*, *aloides*, *chloronotos*, *tortuosa*, *inclinata*, *squarrosa* and *paludosa*. Above the region of forests only two species were seen, viz. *T. aciphylla* and a var. of *T. vinealis*.

## § 1. ALOIDEÆ, Bryol. Europ.

215. *T. rigida*, Schultz. *Recens. Gen. Barbulæ et Syntr.* t. 32. fig. 1 (sub *Barbula*) ; M. P. 161 ; Br. Europ. *Barbula*, p. 13. t. 1. *T. enervis*, H. et Grev. in *Brewst. Journ.* 5. P. 1. p. 288.

*Hab.* Z<sub>1</sub> in terra calcarea, frequens. *Les Eaux Chaudes* ; *Gavarnie* ; &c.

216. *T. ambigua*, B. et S. ! Br. Europ. *Barbula*, p. 14. t. 2 ; M. P. 162.

*Hab.* Z<sub>0</sub> P. occ. in aggeribus subhumidis *St. Sever*.

217. *T. aloides*, Koch in Brid. Br. Univ. 1. p. 816 (sub *Trichostomo*) ; M. P. 163 ; Br. Europ. *Barbula*, p. 15. t. 2. *Tortula rigida*, Turn. ; H. et T. ! *Musc. Brit.* p. 53. t. 12.

*Hab.* Z<sub>0-1</sub> P. occ. et c. in aggeribus calcareis circa *B.-de-Bigorre*, &c.

## § 2. CHLORONOTÆ, Bryol. Europ.

218. *T. chloronotos*, Brid. *Mant. Musc.* p. 90, et Br. Univ. 1. p. 539 (sub *Barbula*). *T. membranifolia*, Hook. *Musci Exotici*, t. 26 ; M. P. 164. *Barbula membranifolia* et *chloronotos*, Br. Europ.

*Hab.* Z<sub>0-1</sub> P. occ. in declivibus calcareis prope *Bilhères*, ad viam quæ ducit a *Pau* ad *Bayonnam*. P. c. ad pagum *Pouzac* (Philippe !). P. or. *Trancade d'Ambouilla* (Arnott !). "In Pyrenæis orientalibus et monte Serrato Cataloniae ubi in terra ochracea primi legimus;" Bridel, *l. c.*

I have never been able to perceive the differences between *T. chloronotos* and *membranifolia* insisted on in 'Bryol. Europæa' (*Barbula*, p. 18), and specimens of the former communicated by M. Schimper from Avignon have the *inflorescence monoicous*, the stem branched and the *leaves membranous at the apex*, precisely as in *T. membranifolia*. In these specimens, as in Arnott's, Philippe's, and my own from *Bilhères*, besides there being axillary male flowers on the fertile plants, there are also *separate male plants* with terminal flowers; but I have seen no specimen of *T. chloronotos* with a truly dioicous inflorescence.

§ 3. CUNEIFOLIÆ, Bryol. Europ.

219. *T. cuneifolia*, Dicks. Crypt. Fasc. 3. p. 7 (sub *Bryo*); M. P. 165; Br. Europ. *Barbula*, p. 31. t. 17.

*Hab.* Z<sub>0</sub> P. occ. in terra argillaceo-arenosa circa *St. Sever*: scæcis *Funaria convexa* et *Muehlenbergii*.

220. *T. canescens*, Mont. Archives de Bot. t. 1. p. 133; M. P. 166; Br. Europ. ! *Barbula*, p. 34. t. 19.

*Hab.* Z<sub>0-1</sub> P. occ. *Landes de Mugriet*, in solo arenoso. P. c. in rupibus schistosis prope *B.-de-Bigorre* et *Loucrup*. P. or. apud *Illiberim* in agro *Ruscinonensi* (Montagne).

221. *T. marginata*, B. et S. Br. Europ. *Barbula*, p. 33. t. 19.

*Hab.* Z<sub>1</sub> P. or. prope *Corbières*, loco *hermitage de St. Antoine de Galamus* (Montagne, *l. c.* sub nom. *T. cæspitosa*, H. et G.). P. occ. in muris prope *Cauterets*.

222. *T. muralis*, L. Sp. Pl. p. 1581 (sub *Bryo*); M. P. 167; Br. Europ. *l. c.* p. 35. t. 20.

*Hab.* Z<sub>0-3</sub> in muris saxisque.

§ 4. RURALES, Bryol. Europ.

223. *T. ruralis*, L. Sp. Pl. p. 1581 (sub *Bryo*); Br. Europ. *l. c.* p. 42. t. 27.

"Var. 1, foliis patulis nec squarroso-recurvis;" M. P. 168. *Barbula ruralis* β. *rupestris*, Br. Europ. *Syntrichia intermedia*, Brid. ! Br. Univ. 1. p. 586.

*Hab.* Z<sub>0-1</sub> in calce arenato murorum prope *Pau*.

This form, which, as the authors of 'Br. Europ.' remark, is found only on a calcareous matrix, is sometimes scarcely larger than *T. muralis*, and its habit is very different from that of the larger, ordinary form of *T. ruralis*; yet it seems impossible to separate it specifically. I have the same form from Dr. Grateloup, gathered near

Bordeaux, and from Dr. Arnott gathered at Avignon, Vaucluse and Restinclières. It matures its fruit in the very early spring.

“Var. 2, foliis acutioribus nonnunquam acuminatis;” M. P. 169.—*Hab.* Z<sub>1-3</sub> locis editioribus secus rivulos, saxatilis. *V. de Combascou; Gavarnie; &c.*

224. *T. aciphylla*, B. et S. ! Br. Europ. *Barbula*, p. 42. t. 26; M. P. 170.

*Hab.* Z<sub>3-4</sub> P. occ. et c. locis saxosis secus ovilia ad basin montis *Maladetta*; in valle *Combascou, &c. Vallon d'Arise* (Philippe!).

In the Pyrenees, as in the Alps, this occupies the highest region of pasturage, and is never found away from the summer habitations of men and cattle.

225. *T. lævipila*, Brid. Mant. Musc. p. 98 (sub *Syntrichia*); Br. Europ. l. c. t. 25.

*Hab.* Z<sub>0-1</sub> ad arborum truncos.

226. *T. papillosa*, Wils. ! mst.; Spruce in Lond. Journ. of Bot. 4. p. 193; M. P. 171.

*Hab.* Z<sub>1</sub> P. occ. in arboribus nemoris *Parc de Pau* dicti.

227. *T. latifolia*, Bruch !; Bryol. Europ. l. c. p. 41. t. 24; M. P. 172.

*Hab.* Z<sub>1</sub> P. occ. locis humidis circa *Jurançon*, ad arborum radices.

§ 5. SUBULATÆ, Bryol. Europ.

228. *T. mucronifolia*, Brid. Mant. Musc. p. 97 (sub *Syntrichia*); Br. Europ. ! l. c. p. 38. t. 23.

*Hab.* “in Pyrenæis orientalibus” (Bridel, l. c.); *Mont Louis* (Arnott!).

229. *T. subulata*, L. Sp. Pl. p. 1581 (sub *Bryo*); M. P. 173; Br. Europ. l. c. p. 36. t. 21, 22.

*Hab.* Z<sub>0-4</sub> ad terram, passim.

Var.  $\beta$ . *inermis*, Brid. Br. Univ. l. p. 581. *T. inermis*, Mont. Arch. de Bot. 1. p. 136. t. 4.—*Hab.* “ad Notre Dame de Peña in agro Ruscinonensi;” (Montagne, l. c.)

This is quite possibly a distinct species, as Dr. Montagne still maintains, but as I have seen only barren specimens of it, gathered by Dr. Arnott at Vaucluse, I confess myself unable to form a decided opinion.

§ 6. CONVOLUTÆ, Bryol. Europ.

230. *T. convoluta*, Hedw. Musc. Frond. l. t. 32 (sub *Barbula*); M. P. 174; Br. Europ. l. c. p. 29. t. 16.

*Hab.* Z<sub>0-1</sub> in terra et muris, haud vulgaris.

“Var. *fragilifolia*, foliis multo longioribus, linearibus, patulo-recurvis, alis undulatis, perichætii laxioris acuminatis;” M. P. 175.—*Hab.* P. occ. in muris pagorum *Jurançon et Bihères.*

§ 7. REVOLUTÆ, Bryol. Europ.

231. *T. revoluta*, Brid. in Schrad. Journ. Bot. 1800; Br. Europ. *l. c.* p. 27. t. 14; M. P. 176.

*Hab.* Z<sub>0-1</sub> cum n. 230, multo autem copiosior.

§ 8. TORTUOSÆ, Bryol. Europ.

232. *T. tortuosa*, L. Sp. Pl. p. 1583 (sub *Bryo*); Br. Europ. *l. c.* p. 26. t. 13; M. P. 177.

*Hab.* Z<sub>1-3</sub> in muris saxisque calcareis, copiosissima et pulcherrime fructifera; rarius ad arbores vetustas.

The cellules of the leaf are minutely papillose, and when viewed from above each marginal cellule usually shows two *salient* papillæ: it is this which gives the edge of the leaf the appearance of being granulated. Is it caused by the pressure of the grains of chlorophyll on the delicate walls of the cellules?

233. *T. inclinata*, Schwgr. Suppl. t. 33 (sub *Barbula*); Br. Europ. *l. c.* p. 25. t. 12; M. P. 178.

*Hab.* Z<sub>1</sub> P. occ. et c. in muris rupibusque calcareis, haud infrequens. *Les Eaux Chaudes. Rontignon. B.-de-Bigorre, &c.*

234. *T. squarrosa*, De Not. Specim. de Tort. Ital. n. 31; Spruce in Lond. Journ. of Bot. 4. p. 193; M. P. 179; Br. Europ. fasc. 31. p. 1. t. 1.

*Hab.* Z<sub>1</sub> in collibus calcareis prope *Jurançon* et *B.-de-Bigorre. Pic St. Loup* prope *Montpellier* (Arnott!).

235. *T. cæspitosa*, Schwgr. Suppl. t. 31 (sub *Barbula*); M. P. 180; Sullivant! Musci Allegh. n. 150. *Barbula cirrhata*, Bryol. Europ. *l. c.* p. 24. t. 11.

*Hab.* Z<sub>2</sub> P. occ. supra ligna putrida in faucibus inter pagum *Penticosa*, et balneas ejusdem nominis, in Aragonia: rarissima.

§ 9. UNGUICULATÆ, Bryol. Europ.

236. *T. unguiculata*, Hedw. Musc. Frond. 1. t. 23 (sub *Barbula*); M. P. 181; Br. Europ. *Barbula*, p. 19. t. 5.

*Hab.* Z<sub>0-1</sub> in muris, &c., frequens; in rupibus ophiticis loco *Gorge de Labassère*.

237. *T. paludosa*, Schwgr. Suppl. t. 30 (sub *Barbula*); M. P. 182; Br. Europ. *l. c.* p. 21. t. 7.

*Hab.* Z<sub>1-2</sub> in rupibus udis calcareis regionis fagorum, sat frequens. *Gorge de Hourat* prope *les Eaux Chaudes*; *Mt. Lhieris, &c.* Nusquam in *paludibus* vidi!

238. *T. gracilis*, Schwgr. Suppl. t. 34 (sub *Barbula*); Br. Europ. *l. c.* p. 22. t. 8.

*Hab.* in Pyrenæis orientalibus (Bridel, Br. Univ. 1. p. 537).

239. *T. fallax*, Hedw. Musc. Frond. 1. t. 24 (sub *Barbula*); M. P. 183; Br. Europ. *l. c.* p. 23. t. 9.

*Hab.* Z<sub>0-2</sub> in rupestribus subhumidis.

240. *T. vinealis*, Brid. Br. Univ. 1. p. 830 (sub *Barbula*); Br. Europ. l. c. p. 24. t. 10.

Var.  $\beta$ . *flaccida*, Br. Europ.; M. P. 184.—*Hab.*  $Z_1$  P. c. ad ripas rivuli qui ad monasterium *Médous* prope *B.-de-Bigorre* originem suam habet.

Var. *nivalis*, M. P. 185.—*Hab.*  $Z_4$  in rupibus frigidis ab aqua nivali irrigatis vallis alpinæ *Esquierry* dictæ.

This second variety forms large compact tufts on the ledges of dripping rocks, growing near *Senecio Tournefortii*, *Euphrasia minima* and *Luzula spadicea*. The stems attain a length of 6 or 8 inches, and are clad throughout with leaves of a deep reddish brown. Hence its aspect is very different from that of the ordinary form of *T. vinealis*, but without the fruit I do not venture to separate it.

#### 41. *Didymodon*, Schwgr. (*ex parte*).

241. *D. rubellus*, Hoffm. Deut. Fl. 2. p. 33 (sub *Bryo*); Br. Europ. *Didymodon*, p. 3. t. 1; M. P. 186. *Weisia curvirostra*, H. et T. ! Musc. Brit. p. 84. t. 14.

*Hab.*  $Z_{0-2}$  in muris, rupibus, &c.

242. *D. cylindricus*, Bruch in Brid. Br. Univ. 1. p. 806 (sub *Weisia*); Br. Europ. l. c. p. 5. t. 3; M. P. 187.

*Hab.*  $Z_2$  P. occ. in saxis rivulorum supra thermas dict. *les Eaux Bonnes*; P. c. in vicinia *B.-de-Luchon*, frequens, locis *Superbagnières*, *Lac de Séculéjo*, *Cascade du Cœur*, &c.

#### 42. *Trichostomum*, Hedwig.

*Obs.* *T. flexicaule* is the only species of this genus which seems absolutely confined to calcareous rock: *T. mutabile*, *crispulum* and *tophaceum* were observed on no other rock in the Pyrenees, but in England I have occasionally seen them in habitats where no trace of carbonate of lime was to be detected. The last five species form part of the genus *Leptotrichum* of Hampe, and are placed by C. Mueller in his tribe *Leptotrichaceæ* (Conf. Syn. Musc. p. 415).

##### § 1. CRISPULA.

243. *T. mutabile*, Bruch mst.; Br. Europ. *Trichostomum*, p. 8. t. 5; M. P. 188.

*Hab.*  $Z_1$  locis calcareis. P. occ. ad pagum *Narcastet*. P. c. in rupibus umbrosis prope *B.-de-Bigorre* (*Chemin de Labassère* et *Bains de Salut*). An revera a sequente distincta species?

244. *T. crispulum*, Bruch et Muell. in Regensb. Bot. Zeitung, 1829; Br. Europ. l. c. t. 4; M. P. 189. *Didymodon Benthamii*, Arnott! in Edinb. New Philosoph. Journ. 1846.

*Hab.*  $Z_1$  in rupibus calcareis irroratis Pyren. occidentalium, frequens. *Pau*; *Narcastet*, &c. *Restinclières* prope *Montpellier* (Arnott!).

“Var. foliis acumine subrecto;” M. P. 190. (Medium inter vars.  $\beta$ . et  $\gamma$ . Br. Europ.)—*Hab. Vallée d’Ossau* prope pagos *Louvie et Jurançon*.

§ 2. RIGIDULA.

245. *T. tophaceum*, Brid. Mant. Musc. p. 84; Br. Europ. *l. c.* p. 9. t. 6; M. P. 191.

*Hab. Z<sub>1</sub>* P. c. ad mortarium in muris subhumidis pagi *Loucrup*, non longe a *B.-de-Bigorre*. P. or. “ad *St. Antoine de Galamus* cum *Tortula marginata*, nec non prope turrim nomine *La Massane* insignitam” (Montagne, *l. c.*).

246. *T. luridum*, Hsch. (sub *Cynodonte*); M. P. 192. *Didymodon luridus*, Br. Europ. *Didym.* p. 4. t. 2.

*Hab. Z<sub>1</sub>* P. occ. in calcareis subhumidis prope *Pau*: socio *Tortula chloronoto*. Prope *Burdigalam* (Grateloup!).

247. *T. rigidulum*, Hedw. Musc. Frond. 3. t. 4 (sub *Didymodonte*); Br. Europ. *Trichostomum*, p. 10. t. 7; M. P. 193.

*Hab. Z<sub>1-2</sub>* in muris rupibusque tum siccis tum humidis, frequens. *Vallées de Castelloubon et d’Ossau*; *Luz*; *Mt. Lhieris*, &c.

§ 3. GLAUDESCENTIA.

248. *T. glaucescens*, Hedw. Musc. Frond. 3. t. 37; Br. Europ. ! *l. c.* p. 18. t. 15; M. P. 194.

*Hab. Z<sub>2-4</sub>* in rupium fissuris. P. occ. in vallibus *Combascou* et *Jéret*. P. c. *Lac de Séculéjo*; *Lac Lehou* (Philippe!). P. or. *Mt. Louis* et *V. d’Eynes* (Arnott!).

§ 4. SUBULATA (= LEPTOTRICHUM, Hampe).

249. *T. tortile*, Schrad. Crypt. Gewäschc, n. 49; Br. Europ. ! *l. c.* p. 14. t. 10; M. P. 195.

*Hab. Z<sub>0-2</sub>* in sylvaticis Pyrenæorum totorum ut et Agri Syrtici: terrestre. *V. du Lys*; *St. Pandelon de Dax*, &c.

250. *T. homomallum*, Hedw. Sp. Musc. t. 23 (sub *Didymodonte*); Br. Europ. *l. c.* p. 16. t. 2; M. P. 196.

*Hab. Z<sub>0-2</sub>* in umbrosis humidis ad terram.

251. *T. flexicaule*, Schwgr. Suppl. t. 29 (sub *Cynodontio*); Br. Europ. ! *l. c.* p. 15. t. 11; M. P. 197.

*Hab. Z<sub>1</sub>* locis calcareis, semper absque fructu.

252. *T. pallidum*, Hedw. Musc. Frond. 1. p. 71. t. 27; Br. Europ. *l. c.* p. 18. t. 14.

*Hab. Z<sub>0-1</sub>* in arenosis umbrosis. P. occ. circa *Dax* (Thore, Grateloup). P. c. *B.-de-Bigorre*! (Philippe!). P. or. *Concampa* (Arnott!).

253. *T. subulatum*, Bruch! in Salzmann Pl. Tingit.; Br. Europ. *l. c.* p. 17. t. 13; M. P. 198. *Didymodon aureus*, De Not. Syll. Musc. p. 190.

*Hab.* Z<sub>0</sub> P. occ. ad aggeres arenosos umbrosos circa *St. Sever*, copiose et pulcherrime!

43. *Distichium*, Bryol. Europ.

254. *D. capillaceum*, Hedw. Musc. Frond. 2. t. 26 (sub *Swartzia*); Br. Europ. *Distichium*, p. 4. t. 1; M. P. 199.

*Hab.* Z<sub>1-4</sub> in rupibus udis præsertim calcareis, frequens.

255. *D. inclinatum*, Hedw. Musc. Frond. 2. t. 27 (sub *Swartzia*); Br. Europ. *l. c.* p. 5. t. 2; M. P. 200.

*Hab.* Z<sub>3-4</sub> P. c. in rupibus micaceis juxta lacum alpinum dict. *Lac Lehou*; nec non in valle alpina *Esquierry*: rarissimum.

[To be continued.]

XL.—*Observations on the recent Foraminifera.*

By WILLIAM CLARK, Esq.

*To the Editors of the Annals of Natural History.*

GENTLEMEN,

Norfolk Crescent, Bath, Feb. 22, 1849.

I HAVE for many years employed myself in malacological pursuits, and had opportunities of observing some of the recent Foraminifera, particularly those of the coralline zones of the South Devon coasts.

As long ago as 1834-5, my friend Mr. Jeffreys of Swansea, who by his extensive researches throughout the British Isles for new and rare Testacea has rendered eminent services in promoting conchological and malacological science, was on a visit to me at Exmouth, during which we had frequent disquisitions on the nature of those minute organisms which at that time were termed Cephalopoda; I then strenuously advocated that they belonged to the coralline group, and were of course polypiferous, and that I believed them, in their natural habitats, to be fixed, similarly to the great mass of Zoophytes; these views, except on the point of fixity, have been fully corroborated by M. Ehrenberg's observations, and during the last summer, 1848, I was enabled, by the occurrence of very recent specimens of *Orthocera Legumen*, to ascertain some new facts relative to these foraminiferous polypes. It has been, I believe to this day, a matter of doubt, if they have at the anterior end tentacular filaments, and as proof in the affirmative, in *Orthocera Legumen*, I have specimens in which the dried linear cilia, about eight, are distinctly to be seen lying radiated in the external sulci of the striulæ of the aperture, and I have little doubt that the creature can withdraw them within the internal hollows of the striæ.